

**WHAT IS CLAIMED IS:**

1. A method to produce uranium dioxide fuel, comprising:  
    providing a porous uranium dioxide arrangement;  
    infiltrating the porous uranium dioxide arrangement with a precursor liquid;  
and  
    thermally treating the porous uranium dioxide arrangement with the infiltrated precursor liquid such that the precursor liquid is converted to a second phase.
2. The method according to claim 1, wherein the precursor liquid is allylhydridopolycarbosilane.
3. The method according to claim 1, further comprising:  
    infiltrating the porous uranium dioxide arrangement with the precursor liquid;  
and  
    thermally treating the porous uranium dioxide arrangement with the infiltrated precursor liquid such that the precursor liquid is converted to the second phase.
4. The method according to claim 1, wherein the second phase is a solid.
5. The method according to claim 1, wherein the step of thermally treating the uranium dioxide arrangement comprises:  
    curing the arrangement; and  
    thermally firing the arrangement.
6. The method according to claim 5, wherein the curing of the arrangement is between 180 and 400 degrees centigrade.
7. The method according to claim 5, wherein the firing of the arrangement is between 850 degrees centigrade and 1700 degrees centigrade.
8. The method according to claim 5, wherein the firing of the arrangement is between 1500 degrees centigrade and 1700 degrees centigrade.

9. The method according to claim 1, wherein the arrangement is provided in pellet form.
10. The method according to claim 1, wherein the thermal treating of the porous uranium dioxide arrangement results in solid silicon carbide.
11. The method according to claim 1, wherein the method is repeated until a thermal conductivity of the fuel arrangement is increased at least 5% compared to a fuel arrangement formed from pure uranium dioxide.
12. The method according to claim 1, wherein the infiltrating of the porous uranium dioxide arrangement with the precursor liquid results in incorporation of the precursor liquid into a center of the uranium dioxide arrangement
13. A nuclear fuel, comprising:
  - an arrangement having a matrix of uranium dioxide; and
  - silicon carbide interspersed in the matrix of uranium dioxide.
14. The nuclear fuel according the claim 13, wherein the arrangement is pellet shaped.
15. The nuclear fuel according to claim 13, wherein a total volume of the arrangement is comprised of up to 10% silicon carbide on a volumetric basis.
16. The nuclear fuel according to claim 15, wherein the silicon carbide is equally interspersed with the uranium dioxide.